Chloro-Organics Detoxification by Immobilized Iron-Chelate-Based Fenton Reaction

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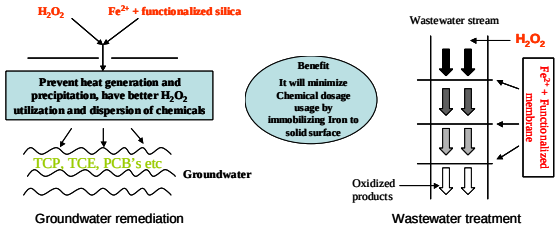
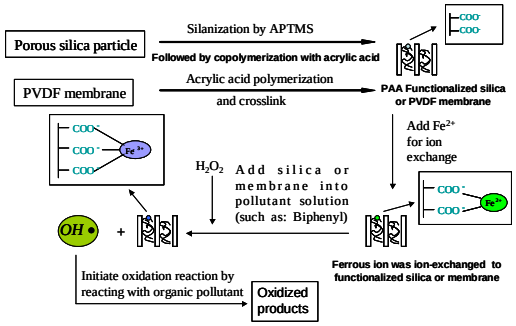
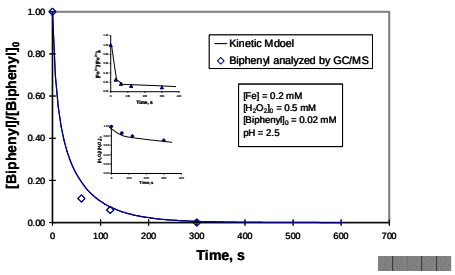
Background

- Chelate-Based Modified Fenton reaction for Pollutant Detoxification
  - The hydroxyl radical-$\cdot OH$ produced by $Fe^{2+} + H_2O_2$ is a highly reactive intermediate
  - It can react with organic pollutant rapidly to form intermediate through hydrogen abstraction or electron transfer
  - Chelate will sequester Fe^{3+} to prevent ferric hydroxide ($Fe(OH)_3$) precipitation
  - Chelate combines with Fe^{2+} to slow down the overall detoxification reaction to maximize reactant usage and avoid temperature rise
- Application and Procedure for Modified Fenton Reaction Involving Immobilized Iron-Chelate

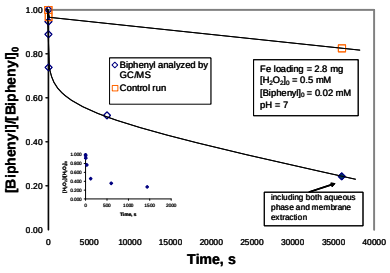




Experimental Results



Biphenyl Destruction by Standard Fenton Reaction



Biphenyl Destruction by iron-chelate immobilized Fenton reaction

Conclusions

- Effective oxidation of chlorinated organics by the chelate-based Fenton reaction demonstrated
- Poly-chelate (such as PAA) can be immobilized on PVDF membrane for repeated use, which has the potential usage for wastewater remediation
- Kinetic models are developed to show a slow reaction can be achieved for a free radical reaction by introducing a chelating agent
- Minimization of temperature rise problem during Fenton reactants injection (demonstrated through actual pilot plant experiments)

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